

**Degree mixing and the propensity for synchronization of  
complex weighted networks**

M. Chavez<sup>1\*</sup>, D.-H. Hwang<sup>2</sup>, S. Boccaletti<sup>3</sup>

<sup>1</sup> LENA-CNRS UPR-640 - Hôpital de la Salpêtrière,  
47, Bd de l'Hôpital. 75651 Paris Cedex 13, France

<sup>2</sup> J. Crayton Pruitt Family Department of Biomedical Engineering,  
University of Florida, P.O. Box 116131. Gainesville, FL 32611-6131

<sup>3</sup> CNR-Istituto dei Sistemi Complessi - Via Madonna del Piano, 10.  
50019 Sesto Fiorentino, Florence, Italy

\* Electronic Address: [mario.chavez@chups.jussieu.fr](mailto:mario.chavez@chups.jussieu.fr)

Real networks often consist of local units interacting with each other by means of heterogeneous connections. In many of these networks, nodes with many connections exhibit a tendency to be connected to other nodes with many (or few) connections. Such degree-degree correlations may have an important influence in the spreading of information or infectious agents on a network. We explore the role played by these degree-degree correlations for the synchronization of networks of coupled dynamical systems. Using a stochastic optimization technique, we find that the value of degree mixing providing optimal conditions for synchronization depends on the weighted coupling scheme. We also show that a minimization of the assortative coefficient may induce a strong destabilization of the synchronous state. We illustrate our findings for weighted networks with scale free and random topologies.